

IN THE UNITED STATE PATENT AND TRADEMARK OFFICE

In re Application of: )  
Shuqing Cui, et al. )  
Application No.: Unassigned ) Group Art Unit: Unassigned  
Filed: Herewith ) Examiner: Unassigned

For: COMPACT BOILER WITH TANKLESS HEATER FOR PROVIDING HEAT AND  
DOMESTIC HOT WATER AND METHOD OF OPERATION

## **PRELIMINARY AMENDMENT**

**Mail Stop Patent Application**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Prior to examination on the merits in this application, please amend the claims of the above-identified application as follows:

## **IN THE SPECIFICATION:**

**Please insert the new paragraph provided below, before the paragraph beginning on page 1.**

This application is a divisional application and claims priority to the non-provisional U.S. Patent Application entitled, **COMPACT BOILER WITH TANKLESS HEATER FOR PROVIDING HEAT AND DOMESTIC HOT WATER AND METHOD OF OPERATION**,

having Serial Number 10/175,889, and filed June 21, 2002, the disclosure of which is hereby incorporated by reference.

**Please replace paragraph 23 with the following:**

**[0023]** Hot gases generated by the combustion of fuel, such as natural gas, in the burners 76 pass up through the heat exchanger 105. The flow of the gases is slowed down by radiation plates 120 which slow the gases enough to provide the gases time to exchange heat into the heat exchanger 105. Transfer of heat from the gases to the boiler water located in the sections 106, 108, 110, and 112 is facilitated by heat transfer pins 127 located on the sections 106, 108, 110, and 112. The gases are vented out through a flue. The inducer fan 56 provides the flow to blow the gases out the flue. The inducer fan 56 is mounted to a collector hood 130 and via a gasket 134.

**Please replace paragraph 25 with the following:**

**[0025]** As described above, the boiler water is heated in the heat exchanger 105 by a heat source. In the illustrated embodiment, the heat source is hot gases generated by combustion, but the heat source could be any number means used for heating. The system or hot boiler water circulates between the sections 106, 108, 110, and 112 via connections 131 at the bottom of each section and also connections 135 at the top of each section. A circulator 62 provides the circulation of the boiler water. Gaskets 133 and 136 may be provided to seal the connections between each section 106, 108, 110 and 112. By circulating the system or boiler water between each section, heat is able to be transferred into the tankless heater 68 located in section 112.

**Please replace paragraph 29 with the following:**

**[0029]** One optional way a boiler in accordance with the invention can be configured is to the piping system shown in FIG. 3. The system shown in FIG. 3 is exemplary only. Any particular system may be modified according to needs and requirements of a specific application. Arrow 137 shows the direction of the boiler water returning from the system circuit (not shown) used to harvest heat from the boiler water. This water is cool and is returning back to the boiler 50 for reheating. Isolation valve 138 is used for convenience of the system in isolating the boiler 50 for various reasons including maintenance. Return line 140 permits the boiler water to return to the boiler 50. The circulator 62 circulates the boiler water within the system circuit or loop. Arrow 148 shows the direction of the hot boiler water exiting from the boiler 50 to the system for providing heating, arrow 150 shows water going to an expansion tank (not shown), and arrow 152 shows where a water source can be used to fill the system for an initial fill, after the system has been drained, or in case the system is depleted due to leaks.

**Please replace paragraph 30 with the following:**

**[0030]** Hot boiler water exiting the heat exchanger 105 can go to one of two places. It can either flow into the heating circuit to be used for providing heating in the direction of arrow 148 or the hot boiler water can be sent back to the heat exchanger 105 and bypass the heating circuit entirely. The purpose for hot boiler water to bypass the circuit is to create DHW. The three-way valve 66 permits the bypass.

**Please replace paragraph 32 with the following:**

**[0032]** In some optional embodiments, a sensor 60 is located close to the tankless heater 68 in order to determine that a temperature within the tankless heater 68 is one of appropriate value. This sensor 60 may send a signal corresponding to the temperature within the tankless

heater 68 to the controller 52. Based on signals sent by the sensors 60 the controller may operate three way valve 66 or provide DHW or hot water for the heat circuit whichever is desired. A second sensor 126 is provided attached to the left end section 106. This sensor 126 may detect the temperature of the hot boiler water within heat exchanger 105 and send a signal to the controller 52 to prevent boiler from overheating.

**Please replace paragraph 35 with the following:**

**[0035]** In accordance with the invention, some embodiments of the invention use two operation sequences. One is for generating hot boiler water for space heating, and the other is for generating DHW. Generating hot boiler water for space heating is done when the boiler 50 is given a call for space heating heat. The call for heat is usually done by a thermostat (not shown). The three-way valve 66 will be in position to allow water to pass from pipe 74 into pipe 156. The control module 52 will supply power to the inducer fan 56 for purging residual gases through the exchanger 105 and flue, and the circulator 62 will circulate hot water to the heating system. The pressure switch contact 58 is closed to prove there is proper air flow for combustion. The control module 52 will generate a spark to the pilot burner 92. Once the pilot burner ignition is established, the spark generation turned off and a flame sensor senses the pilot flame and the main gas valve 80 opens, the main burners 76 will establish full ignition. The control module 52 will maintain the boiler 50 in operation until the room thermostat is satisfied and sends a signal that no more hot boiler water is required to generate room heating.

**Please replace paragraph 36 with the following:**

**[0036]** The other operation sequence is to provide DHW. The sensor 60 is located close to the tankless water heater coil 119. When a DHW faucet is opened the sensor 60 will sense a demand for DHW. The three-way valve 66 will move from its position of permitting water to